MARKED-UP VERSION OF THE AMENDED CLAIMS

(Version with markings to show changes made)

1. (twice amended) A method for contactless measurement of a wall thickness of a transparent object by employing of light sources, lenses, deflection mirrors or deflection prisms, semi permeable mirrors as well as line sensors and a controller, characterized in that light from a first illuminating surface (11) is initially collimated and in the following focused onto a surface of the transparent object (1) with an angle <u>of</u> incidence relative to a normal of the surface, wherein two reflexes of light [, which reflexes occur] <u>occurring</u> at a front side (1.1) and at an inner side (1.2), are imaged furthermore onto a first opto-electronic image resolving sensor (26) and wherein light from a second illuminating surface (21) is <u>also</u> simultaneously [also initially] collimated <u>initially</u> and in the following focused in the direction toward the surface of the transparent object (1), wherein the direction toward the surface of the transparent object (1) corresponds to [the] <u>an</u> exit direction of the light from the first illuminating surface (11), and wherein furthermore reflexes of light are imaged onto the second opto-electronic image resolving sensor (16) and wherein the average value of [the] distances [of the] <u>between</u> respective two reflexes on <u>each of</u> the two opto-electronic image resolving sensors is evaluated as a measure of the wall thickness in a following disposed controller (3).

2. (twice amended) Device for contactless measurement of wall thickness of a transparent object employing light sources, lenses, semi permeable mirrors or semi permeable prisms as well as image resolving sensors and a controller, characterized in

that a lens (12) is disposed following to a first illuminating surface (11), wherein semi permeable mirror (13) is disposed behind the lens (12) in such a way that light is reflected into an objective (14) and is further focused onto the transparent object (1) and wherein furthermore an objective (24) is disposed such that the objective (24) together with a lens (25) images beams reflected at the transparent object (1) onto a sensor (26) through a semi permeable mirror (23) and wherein a lens (22) is simultaneously coordinated to a second illuminating surface (21), wherein the semi permeable mirror (23) is disposed following to the lens (22) in such a way that light from the second illuminating surface (21) is focused also onto the transparent object (1), wherein the direction of incidence of light corresponds to [the] an exit direction of light from the first illuminating face and wherein reflexes are imaged onto a sensor (16) through the objective (14), wherein a controller (3) is connected [following] to the two sensors (16) and (26).

9. (new) A method for contactless measurement of a wall thickness of a transparent object by employing of light sources, lenses, defelction mirrors or deflection prisms, semi permeable mirrors as well as line sensors and a controller, characterized in that light from a first illuminating surface (11) is initially collimated and in the following focused onto a surface of the transparent object (1) with an angle of incidence relative to a normal of the surface, wherein two reflexes of light, which occur at a front side (1 .1) and at an inner side (1.2), are imaged onto a first opto-electronic image resolving sensor (26) and wherein light from a second illuminating surface (21) is also simultaneously collimated initially and in the following focused in the direction toward the surface of the transparent object (1), wherein the direction toward the surface of the transparent object (1) corresponds to the emergent direction of light from the first illuminating surface (11), and

wherein reflexes of the light which has been sent out from the second illuminating surface (21) are imaged onto the second opto-electronic image resolving sensor (16) and wherein the average value of the two distances of the respective reflections which has been imaged on each of the two opto-electronic image resolving sensors is evaluated as a measure of the wall thickness in a disposed controller.

10. (new) Device for contactless measurement of wall thickness of a transparent object employing light sources, lenses, semi permeable mirrors or semi permeable prisms as well as image resolving sensors and a controller, characterized in that a lens (12) is disposed following to a first illuminating surface (11), wherein a semi permeable mirror (13) is disposed behind the lens (12) in such a way that light is reflected into an objective (14) and is further focused onto the transparent object (1) and wherein furthermore an objective (24) is disposed such that the objective (24) together with a lens (25) images beams reflected at the transparent object (1) onto a sensor (26) through a semi permeable mirror (23) and wherein a lens (22) is simultaneously coordinated to a second illuminating surface (21), wherein the semi permeable mirror (23) is disposed following to the lens (22) in such a way that light from the second illuminating surface (21) is focused also onto the transparent object(1), wherein the direction of incidence of light corresponds to the emergent direction of light from the first illuminating surface and wherein reflexes are imaged onto a sensor (16) through the objective (14), wherein a controller (3) is connected to the two sensors (16) and (26).

11. (new) A device for contactless measurement of a wall thickness of a container glass being a transparent object (1) with a front side (1.1) and a rear side (1.2) comprising

a first illuminating surface (11) for generating first diverging light beams;

a first lens (12) disposed in the area of the first diverging light beams and for generating first parallel light beams from the diverging light beams generated by the first illuminating surface (11);

a first semi-permeable mirror (13) disposed in a path of the first parallel light beams for reflecting the first parallel light beams;

a first objective (14) disposed in a path of reflected first parallel light beams for focusing the reflected first parallel light beams in the area of the front side (1.1) and rear side (1.2) of the transparent object (1);

a second objective (24) disposed in a path of first light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) for focusing the first light beams into third parallel light beams;

a second semi-permeable mirror (23) disposed in a path of the third parallel light beams for passing the third parallel light beams;

a second sensor (26);

a fourth lens (25) disposed in the path of the third parallel light beams for focusing the third parallel light beams onto the second sensor (26);

a second illuminating surface (21) for generating second diverging light beams;

a second lens (22) disposed in the area of the second diverging light beams and for generating second parallel light beams from the second diverging light beams generated by the second illuminating surface (21);

wherein the second semi-permeable mirror (23) is disposed in a path of the second parallel light beams for reflecting the second parallel light beams;

wherein the second objective (24) is disposed in the path of the reflected second parallel light beams for focusing the reflected second parallel light beams in the area of the front side (1.1) and rear side (1.2) of the transparent object (1);

wherein the first objective (14) is disposed in a path of second light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) for focusing the second light beams into fourth parallel light beams;

wherein the first semi-permeable mirror (13) disposed in a path of the fourth parallel light beams for passing the fourth parallel light beams;

a first sensor (16);

a third lens (15) disposed in the path of the fourth parallel light beams for focusing the fourth parallel light beams onto the first sensor (16);

a controller (3) connected to the first sensor (16) and connected to the second sensor (26) for averaging values determined by the first sensor (16) and determined by the second sensor (26).

12. (new) The device according to claim 11 wherein the first illuminating surface (11) is a diffusely illuminating surface and wherein the second illuminating surface (21) is a diffusely illuminating surface.

13. (new) The device according to claim 11 wherein the reflected first parallel light beams focused in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) are impinging onto the object (1) from different angles of incidence; and

wherein the reflected second parallel light beams focused in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) are impinging onto the object (1) from different angles of incidence.

14. (new) The device according to claim 11 wherein

parts of the first light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) are entering the second objective (24) despite a grained, uneven surface of the object and even though other parts of the first light beams are not available based on surface defects of the object (1); and

wherein parts of the second light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) are entering the first objective (24) despite a grained, uneven surface of the object and even though other parts of the second light beams are not available based on surface defects of the object (1).

15. (new) The device according to claim 11 wherein

a second optical system is identically constructed as is a first optical system and operates with a reversed beam direction for compensating errors based on wedge shape and tipping.

16. (new) The device according to claim 11 wherein the first diverging light beams have a first origin at different points of the first illuminating surface; and

wherein the second diverging light beams have a second origin at different points of the second illuminating surface

17. (new) The device according to claim 11 wherein the first divergent light beams comprise incoherent light; and

wherein the second divergent light beams comprise incoherent light.

18. (new) The device according to claim 11 wherein the first divergent beams do not comprise laser light and wherein the second diverging beams do not comprise laser light.

19. (new) A method of contactless measurement of a wall thickness of container glass being a transparent object (1) with a front side (1.1) and a rear side (1.2) comprising the steps of:

generating first diverging light beams on a first illuminating surface (11);

generating first parallel light beams from the diverging light beams generated by the first illuminating surface (11) with a first lens (12) disposed in the area of the first diverging light beams;

reflecting the first parallel light beams with a first semi-permeable mirror (13) disposed in a path of the first parallel light beams;

focusing reflected first parallel light beams in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) with a first objective (14) disposed in a path of the reflected first parallel light beams;

focusing the first light beams into third parallel light beams with a second objective (24) disposed in a path of first light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1);

passing the third parallel light beams through a second semi-permeable mirror (23) disposed in a path of the third parallel light beams;

focusing the third parallel light beams onto a second sensor (26) with a fourth lens (25) disposed in the path of the third parallel light beams;

generating second diverging light beams with a second illuminating surface (21);

generating second parallel light beams from the second diverging light beams generated by the second illuminating surface (21) with a second lens (22) disposed in the area of the second diverging light beams;

reflecting the second parallel light beams with the second semi-permeable mirror (23) disposed in a path of the second parallel light beams;

focusing the reflected second parallel light beams in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) with the second objective (24) disposed in the path of the reflected second parallel light beams;

focusing second light beams reflected in the area of the front side (1.1) and rear side (1.2) of the transparent object (1) into fourth parallel light beams with the first objective (14) disposed in a path of second light beams ;

passing the fourth parallel light beams through the first semi-permeable mirror (13) disposed in a path of the fourth parallel light beams;

focusing the fourth parallel light beams onto a first sensor (16) with a third lens (15) disposed in the path of the fourth parallel light beams;

averaging values determined by the first sensor (16) and determined by the second sensor (26) in a controller (3) connected to the first sensor (16) and connected to the second sensor (26).

20. (new) The method according to claim 19 further comprising

imaging a first reflex derived from the front side (1.1) of the object (1) onto the second sensor (26);

imaging a third reflex derived from the rear side (1.2) of the object (1) onto the second sensor (26);

determining a first distance of the first reflex and of the third reflex on the second sensor (26);

imaging a second reflex derived from the front side (1.1) of the object (1) onto the first sensor (16);

imaging a fourth reflex derived from the rear side (1.2) of the object (1) onto the first sensor (16);

determining a second distance of the second reflex and of the fourth reflex on the first sensor (16);

averaging a size of the first distance and a size of the second distance.

REMARKS

Claims 1 through 8 continue to be in the case.

New claims 9 through 20 are being submitted.

Claim 9 is based on the language of claim 1.

Claim 10 is based on the language of claim 2. The applicants believe that claims 9 and 10 are particularly suitable to overcome the rejections of the

Office Action of October 24, 2002. An evaluation of claims 9 and 10 is particularly requested.

New claim 11 is based on the language of claim 7.

New claim 12 is based on the specification, page 6, line 16.

New claim 13 is based on the specification, page 6, lines 21 and 22.

New claim 14 is based on the specification, page 6, line 22 through page 7, line 4.

New claim 15 is based on the specification, page 7, lines 6 through 13.

New claim 16 is based on the specification, page 9, lines 21 through page 10, line 1.

New claim 17 is based on the specification, page 10. lines 11 through 18.

New claim 18 is based on the specification, page 10, lines 11 through 18.

New claim 19 is based on claim 11.

New claim 20 is based on the specification, page 9, lines 6 through 19.

The Office Action provides a Response to Amendments. Applicant's amendments filed June 28, 2002 to correct the errors detailed in the previous office action have been fully considered but they are not

complete and continues to have several serious errors. Therefore this action is made FINAL.

Applicants endeavor to correct any errors pointed out in the Office Action promptly:

The Office Action refers to Drawings.

2. The drawings stand objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description, claims and abstract: reference numbers 1.1 and 1.2 are not shown in the drawing. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

A corrected drawing is being submitted.

The Office Action refers to Claim Objections.

3. Claim 1 stands objected to because of the following informalities: "of' is missing between the words "angle" and "incidence" on line 6. Appropriate correction is required.

Applicants are thanking the Examiner for pointing out the error and are correcting the same.

4. Claim 1 stands objected to because of the following informalities: the word "which" on line 7 in not appropriate and makes the limitations of claimed subject matter unclear. Appropriate correction is required.

Claim 1 is being corrected.

5. Claim 1 stands objected to because of the following informalities: the limitation "...is simultaneously also initially collimated ..." on lines 10-11

is confusing. A better format would be ". . . is also simultaneously collimated initially . . . ". Appropriate correction is required.

The language kindly proposed by the Examiner is now part of claim 1.

6. Claim 2 stands objected to because of the following informalities: the word "following" on the lastline in inappropriate. The Examiner suggests that the said word be deleted. Appropriate correction is required.

The objectionable language is being deleted.

The Office Action refers to Claim Rejections - 35 USC § 112.

8. Claim 1 recites the limitation "the exit direction" in line 13. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

The present amendment corrects claim 1.

9. Claim 1 stands rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "furthermore reflexes" on lines 14-15 raises the question if there are more than two reflexes as stated on line 7, or if they are different from the said two reflexes on line 7, and which ones and which distances are being measured by the sensors?

There are two reflexes on each of two opto-electronic imaging resolving sensors.

10. Claim 1 recites the limitation "the distances" in line 16. There is insufficient antecedent basis for this limitation in the claim. Is the applicant

referring to the distance between the two reflexes on the sensor? Appropriate correction is required.

Claim 1 is being corrected.

11. Claim 2 recites the limitation "the exit direction" in line 16. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

The objection is being corrected.

The Office Action refers to Claim Rejections - 35 USC § 103.

13. Claims 1-8 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Spengler et al (US 5.636,027) in view of Takamasa (JP 58022902) and further in view of what is commonly known in the art.

The rejection is respectfully traversed.

Spengler et al (Spengler hereinafter) discloses a method and apparatus comprising all the claim limitations (see col.3, line 36- col.4, line 10, Figure 1) except the use of lasers as a light sources instead of applicants use of "light surfaces", and the use of lenses for shaping the light beams, for the purpose of making contactless measurement of the thickness of an object made of transparent material.

There are additional differences:

Claim 7 requires a presence of a first lens (12) and of a second lens (22). No such lenses are taught in Spengler.

Claim 7 further requires a first objective (14) and a second objective (24). No such objectives are seen in the Spengler reference.

Claim 7 further requires a presence of a third lens (15) and of a fourth lens (25). No such lenses are taught in Spengler.

Takamasa discloses the use of lenses 3, 7 (see Figure) for shaping the light beams, for the purpose of making contactless measurement of the thickness of an object made of transparent material. Also, the use of various types of light sources for the purpose of making contactless measurement of the thickness of an object made of transparent material is commonly known in the art.

There are additional differences:

Claim 7 requires a presence of a first lens (12) and of a second lens (22). No such lenses are taught in Takamasa.

Claim 7 further requires a first objective (14) and a second objective (24). No such objectives are seen in the Takamasa reference.

In view of Takamasa' teachings and what is commonly known in the art, it would have been obvious to one of ordinary skills in the art at the time the invention was made to incorporate refractive elements such as lenses for beam shaping and provide alternate/substitute light sources into Spengler's apparatus/method for making contactless measurement of the thickness of an object made of transparent material. Accordingly, such incorporation/substitution would have constituted an alternative means/obvious engineering expedience for one of ordinary skill in the art.

Applicants urge that were Spengler and Takamasa agree not to have a first lens (12) and of a second lens (22), that it is then clearly unobvious over these references to have a first lens (12) and of a second lens (22).

Applicants further urge that where Spengler and Takamasa agree not to have a first objective (14) and a second objective (24), that it is then clearly unobvious to have a first objective (14) and a second objective (24).

It is submitted that the amendment is a bona fide attempt to advance the prosecution by amendments to the claims seeking to overcome rejections based on the applied prior art and/or rejections under 35 U.S.C. 112.

It is submitted that the present amendment complies with observations made in the Final Rejection.

Reconsideration of all outstanding rejections is respectfully requested.

Entry of the present amendment is respectfully requested. All claims as presently submitted are deemed to be in form for allowance and an early notice of allowance is earnestly solicited.

Respectfully submitted,

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Fig. 1